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PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: BROMBERG et al.

Appl. No.: 09/960,046

Filed: September 21, 2001

For: PLASMATRON-CATALYST
SYSTEM

Art Unit: 1764

Examiner: WACHTEL, Alexis A.

Atty Docket: 0492611-0413

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

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DECLARATION OF ALEXANDER RABINOVICH UNDER 37 C.F.R. §1.132

I, Alexander Rabinovich, declare as follows:

1. I am a co-inventor of the subject matter described and claimed in the above-captioned patent application (hereinafter "the '046 application").
2. I am a Research Engineer in the Plasma Science and Fusion Center at the Massachusetts Institute of Technology, Cambridge, Massachusetts. I have been working in the field of plasma science and have been studying fuel reforming processes using plasmatron fuel reformer technology for over 20 years.
3. This statement is presented to overcome the rejection of the claims of the present '046 application over U.S. Patent No. 5,409,784 to Bromberg et al. (hereinafter "the '784 patent"). It is my understanding that the Examiner has rejected claims directed to positioning of a catalyst so as to be activated by hydrogen and radicals produced by a plasmatron and, specifically, within 1-10 cm downstream from a plasmatron as being unpatentable over the '784 patent and that the Examiner specifically cites col. 9, lines 19-26 and Figure 10 of the '784 patent.

4. I agree with and confirm the content of the paragraphs of the '046 application on page 7, lines 1-14 directed to the synergy achieved in the close positioning of a catalyst downstream from a plasmatron. In a catalyst positioned closely downstream from a plasmatron, radicals produced in the plasma can travel to the location of the catalyst and activate the catalyst to generate very active catalysis. The radicals have finite lifetimes on the order of 10 microseconds to 1 millisecond. For velocities of 10-100 m/s, the catalyst needs to be located within 1 cm to 10 cm downstream from the plasma source in order to effectively use the radicals that are generated.
5. I am a co-inventor of the subject matter and invention disclosed and claimed in the '784 patent.
6. I submit that in no experiments conducted prior to the filing of the '784 patent was a hydrogen separator membrane, as referenced in col. 9, lines 19-26 of the '784 patent, positioned so as to be activated by hydrogen and radicals produced by a plasmatron or, specifically, within 1 to 10 cm downstream from a plasmatron. Positioning the hydrogen separator membrane in such a manner was not contemplated in developing the subject matter of the '784 patent. Moreover, although the hydrogen separator membrane is identified as potentially containing palladium, which is a material that may be used as a catalyst, the hydrogen separator membrane of the '784 patent did not serve as a catalyst but rather was employed to separate the desired hydrogen output from carbon containing species such as carbon monoxide and carbon dioxide. Accordingly, there was no recognized desirability in the '784 patent of placing the hydrogen separator in a position so as to be activated by hydrogen and radicals produced by the plasmatron or within 1 to 10 cm downstream from a plasmatron. The desirability and beneficial effects of positioning a catalyst downstream from a plasmatron in the manner as noted above in paragraph 4 was not recognized until the conception of the invention claimed in the present '046 application.

7. For these reasons, I believe that the invention as claimed in the '046 application including a catalyst positioned so as to be activated by hydrogen and radicals produced by the plasmatron or, specifically, positioned within 1 to 10 cm downstream from the plasmatron is different from anything taught or suggested by the '784 patent.
8. I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements are made with knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of this Application for Patent or any patent issuing thereon.

Respectfully submitted,

Date: February 25, 2004

Alexander Rabinovich
Alexander Rabinovich